MATLAB EXPO

MATLAB을 활용한 간편 데이터 분석 및 인공지능

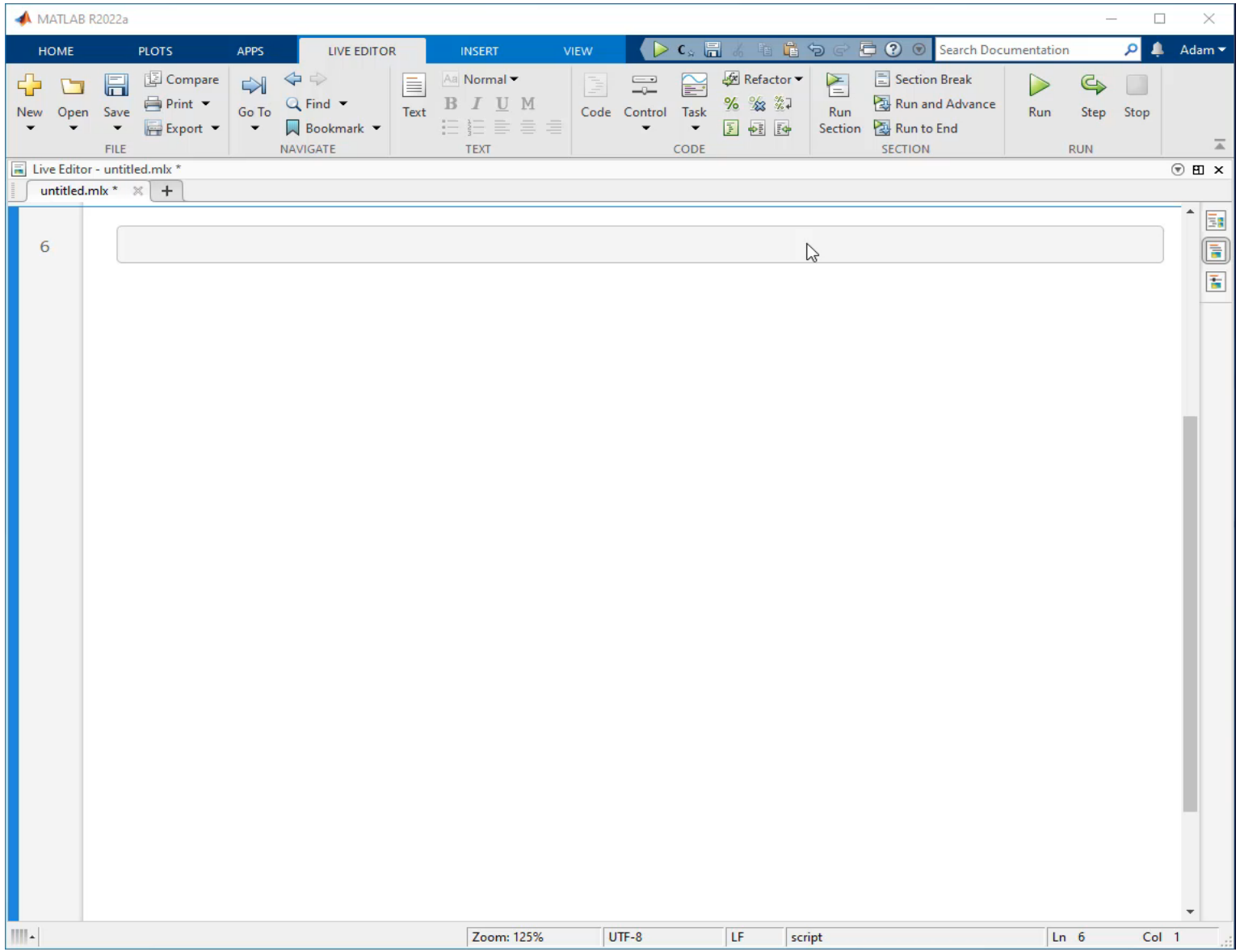
장규환 부장(Ph.D), 매스웍스코리아

MathWorks

What are “low code” tools?

Low code tools enable:

- rapid software development
- minimal manual coding



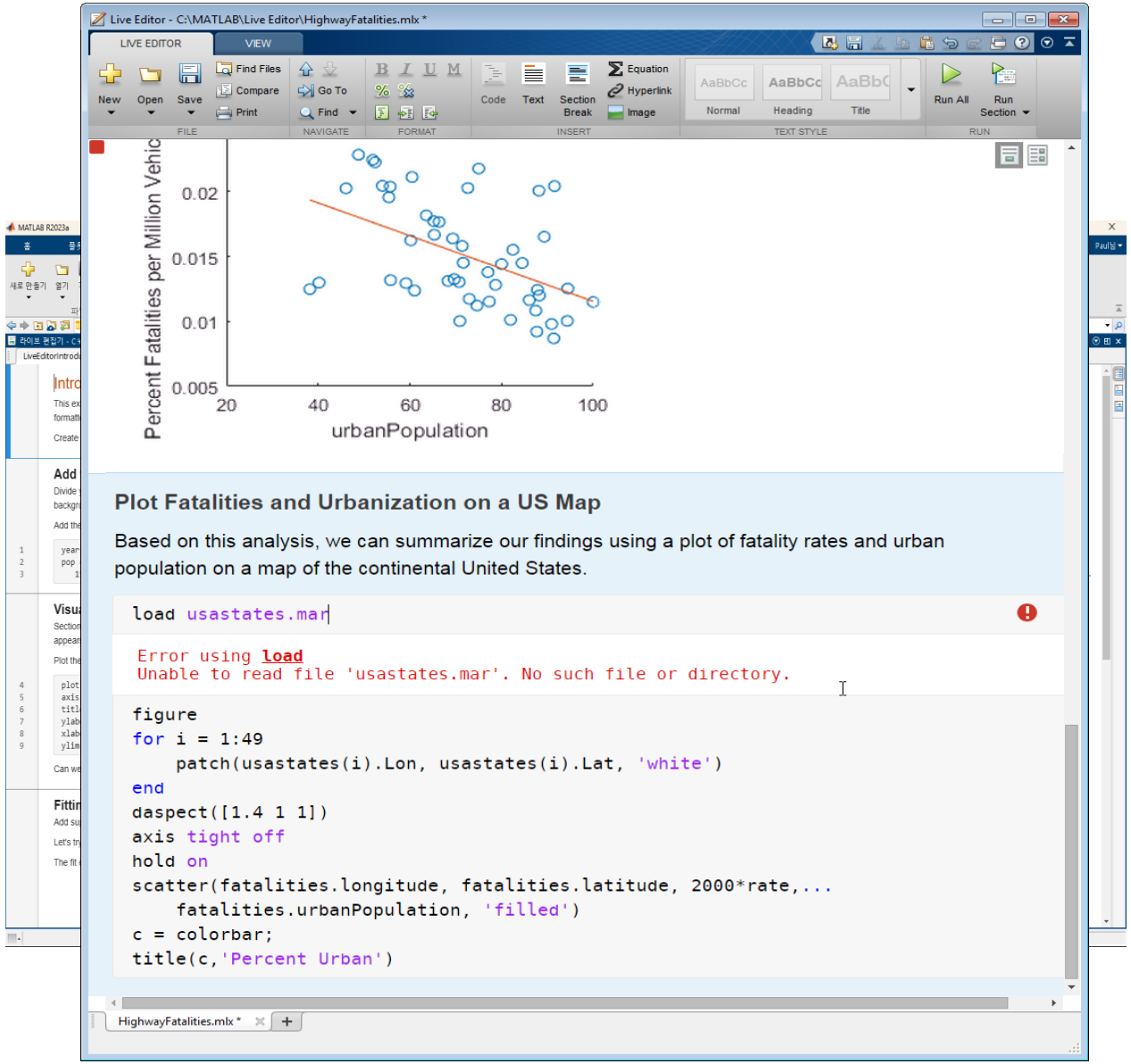
Benefits of low code tools:

- Shallow learning curve
- Teach *how* to code
- Solve task first, code later

Not just for beginners

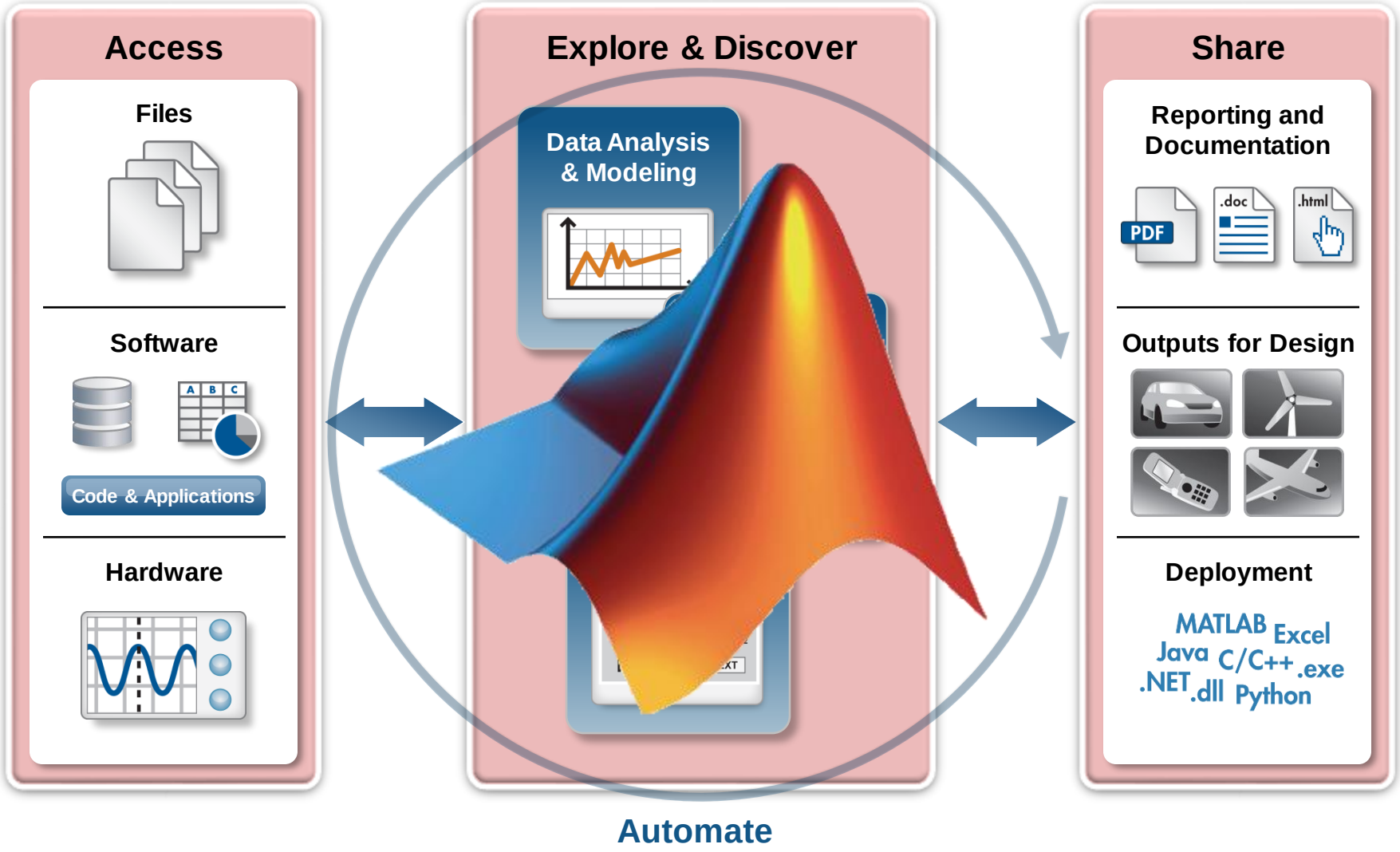
What is the Live Editor?

- See your results alongside the code that produced them
- Run sections of code individually or run the whole file
- Find errors at the location in the file where they occur



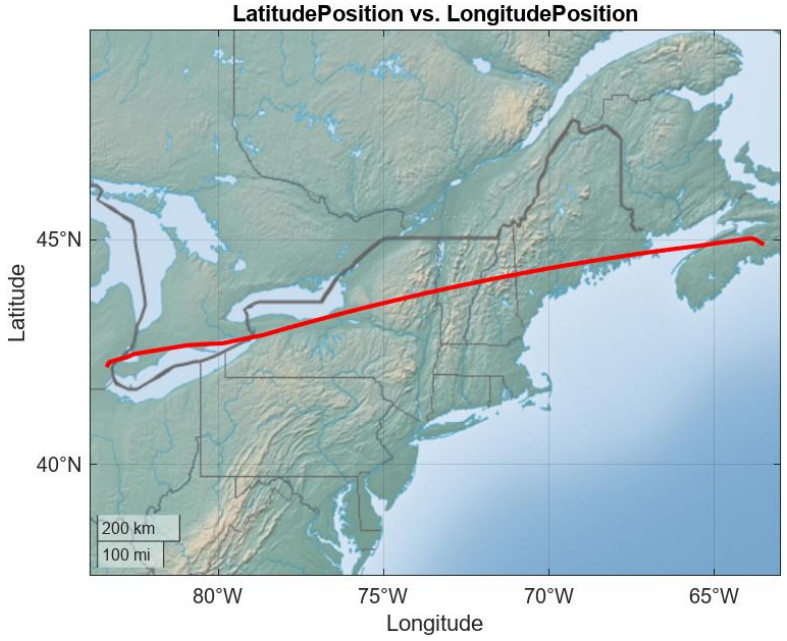
The Live Editor provides a new way to create, edit, run, and share MATLAB code.

MATLAB simplifies the **data analysis** workflow with low code tools



Case Study: Get Flight Sensor Data ready for Modeling

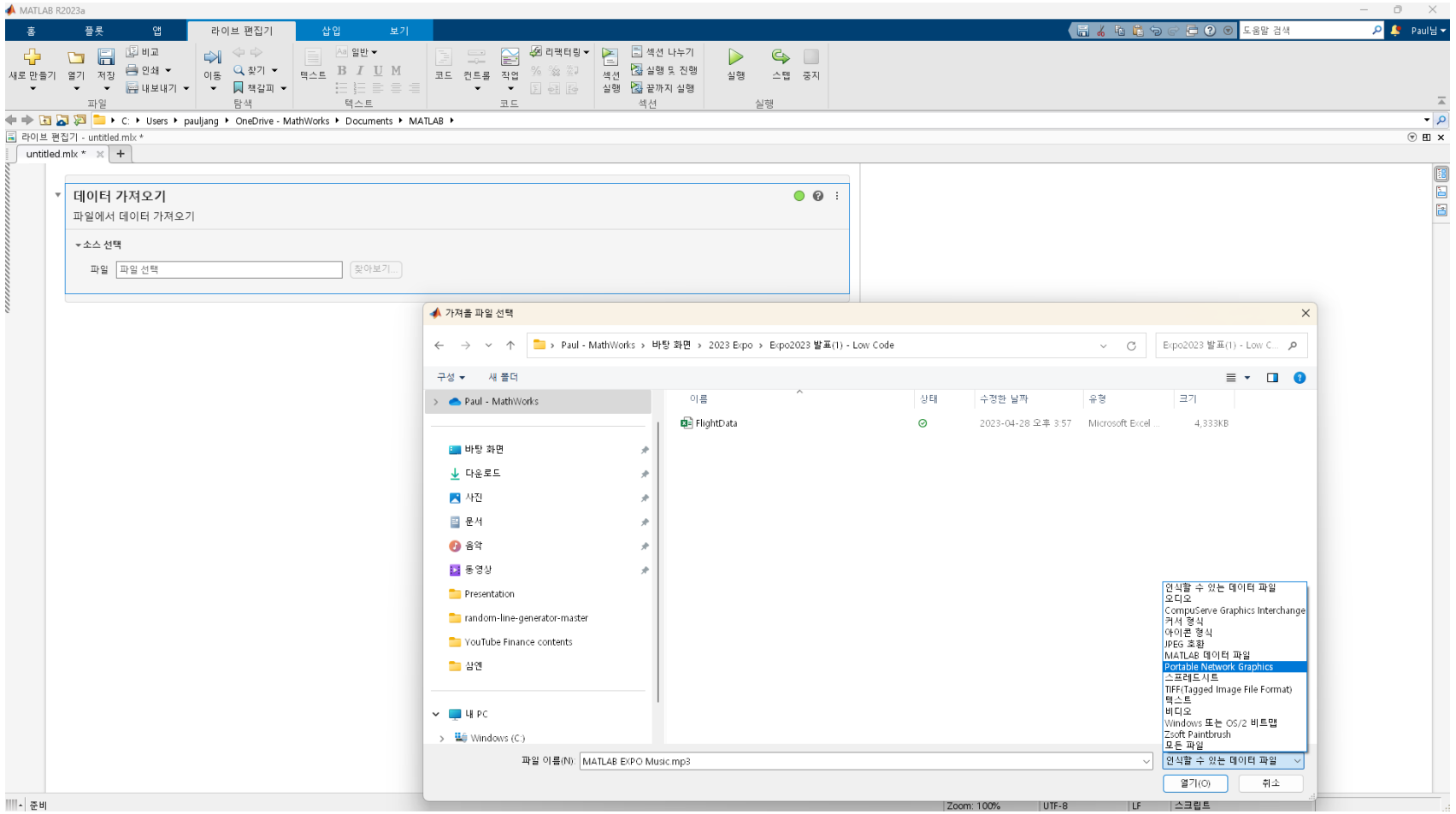
- **Objective:**
  - Explore, analyze and prepare flight sensor data for modeling
- **Inputs:**
  - Excel file with raw flight sensor data
- **Output:**
  - Cleaned sensor data that can be trained to predict Air Speed
  - Reusable code
- **Source:**
  - [NASA Dash Link: Sample Flight Data]



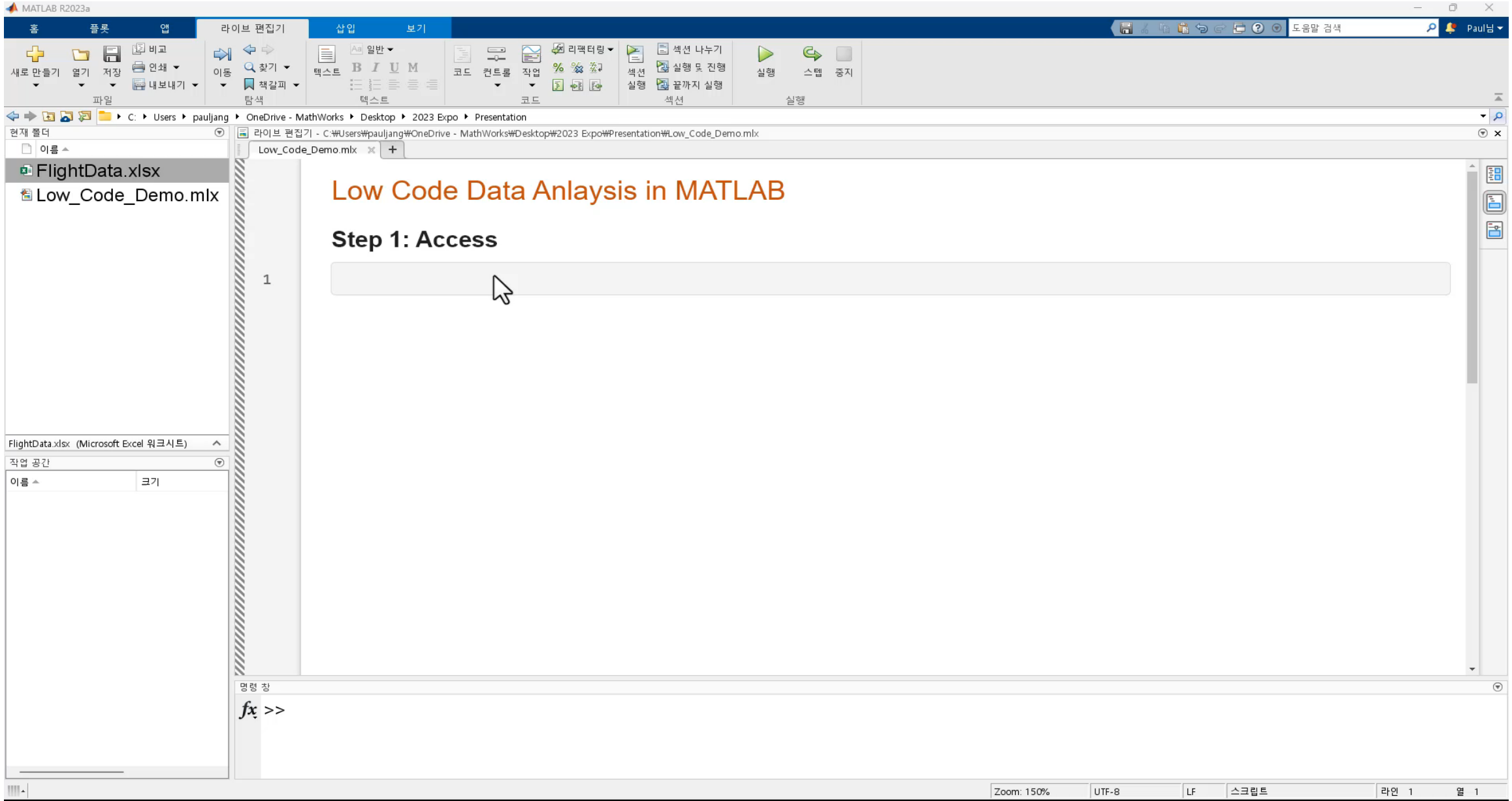
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Time	FuelQuantity	Latitude	Longitude	OilPressure	OilTemperature	FlightPhaseFromACMS	WeightOnWheels	Altitude	ExhaustGasTemperature	FuelFlow	TrueAirSpeed	WindDirection
2	6/2/2001 5:41	8048	44.8915135	-63.519183	0	23.67477417	Planning	0	419	17.5	0	0	0
3	6/2/2001 5:41	8048	44.8915135	-63.519183	0	23.67477417	Planning	0	419	17.5	0	0	0
4	6/2/2001 5:41	8048	44.8915135	-63.519183	0	23.67477417	Planning	0	420	17.5	0	0	0
5	6/2/2001 5:41	8048	44.8915135	-63.519183	0	23.67477417	Planning	0	419	17.5	0	0	0
6	6/2/2001 5:41	8048	44.8915135	-63.519183	0	23.67477417	Planning	0	419	17.5	0	0	0
7	6/2/2001 5:41	8048	44.8915135	-63.519183	0	23.67477417	Planning	0	420	17.5	0	0	0
8	6/2/2001 5:41	8048	44.8915135	-63.519183	0	23.67477417	Planning	0	419	17.5	0	0	0
9	6/2/2001 5:41	8048	44.8915135	-63.519183	0	23.67477417	Planning	0	419	17.5	0	0	0
10	6/2/2001 5:41	8048	44.8915135	-63.5189992	0	23.67477417	Planning	0	419	17.5	0	0	0
11	6/2/2001 5:41	8048	44.8915135	-63.5189992	0	23.67477417	Planning	0	418	17.5	0	0	0
12	6/2/2001 5:41	8048	44.8915135	-63.5189992	0	23.67477417	Planning	0	420	17.5	0	0	0
13	6/2/2001 5:41	8048	44.8915135	-63.5189992	0	23.67477417	Planning	0	419	17.5	0	0	0
14	6/2/2001 5:41	8040	44.8915135	-63.5189992	0	23.67477417	Planning	0	419	17	0	0	0
15	6/2/2001 5:41	8040	44.8915135	-63.5189992	0	23.67477417	Planning	0	419	17	0	0	0
16	6/2/2001 5:41	8040	44.8915135	-63.5189992	0	23.67477417	Planning	0	418	17	0	0	0
17	6/2/2001 5:41	8040	44.8915135	-63.5189992	0	23.67477417	Planning	0	419	17	0	0	0
18	6/2/2001 5:41	8032	44.8915135	-63.5189992	0	25.0178833	Plan	0	418			0	0
	2001 5:41	8032	44.8915		0	25.0178833							

Data Access

- Data Import Tool
- Live Script Task
- Various data formats
- Automatic MATLAB code generation
- Distinguishable by sheet in Excel data



Data Access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앱
라이브 편집기
삽입
보기
도움말 검색
Paul님
새로 만들기
열기
저장
비교
인쇄
내보내기
파일
이동
찾기
책갈피
탐색
텍스트
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코드
컨트롤
작업
리팩터링
코드
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FlightData.xlsx (Microsoft Excel 워크시트)
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Low_Code_Demo.mlx
Low Code Data Anlaysis in MATLAB
Step 1: Access
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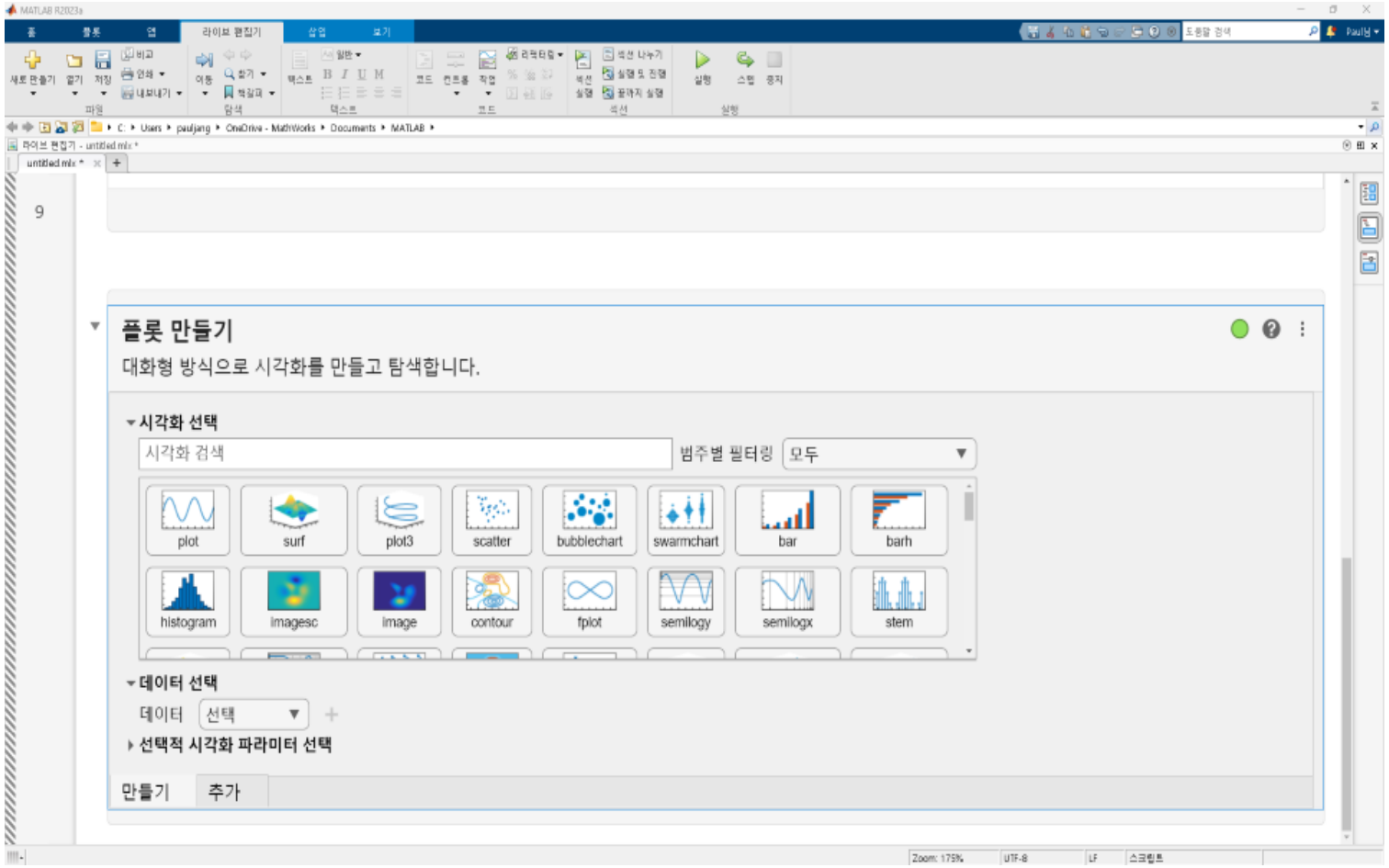
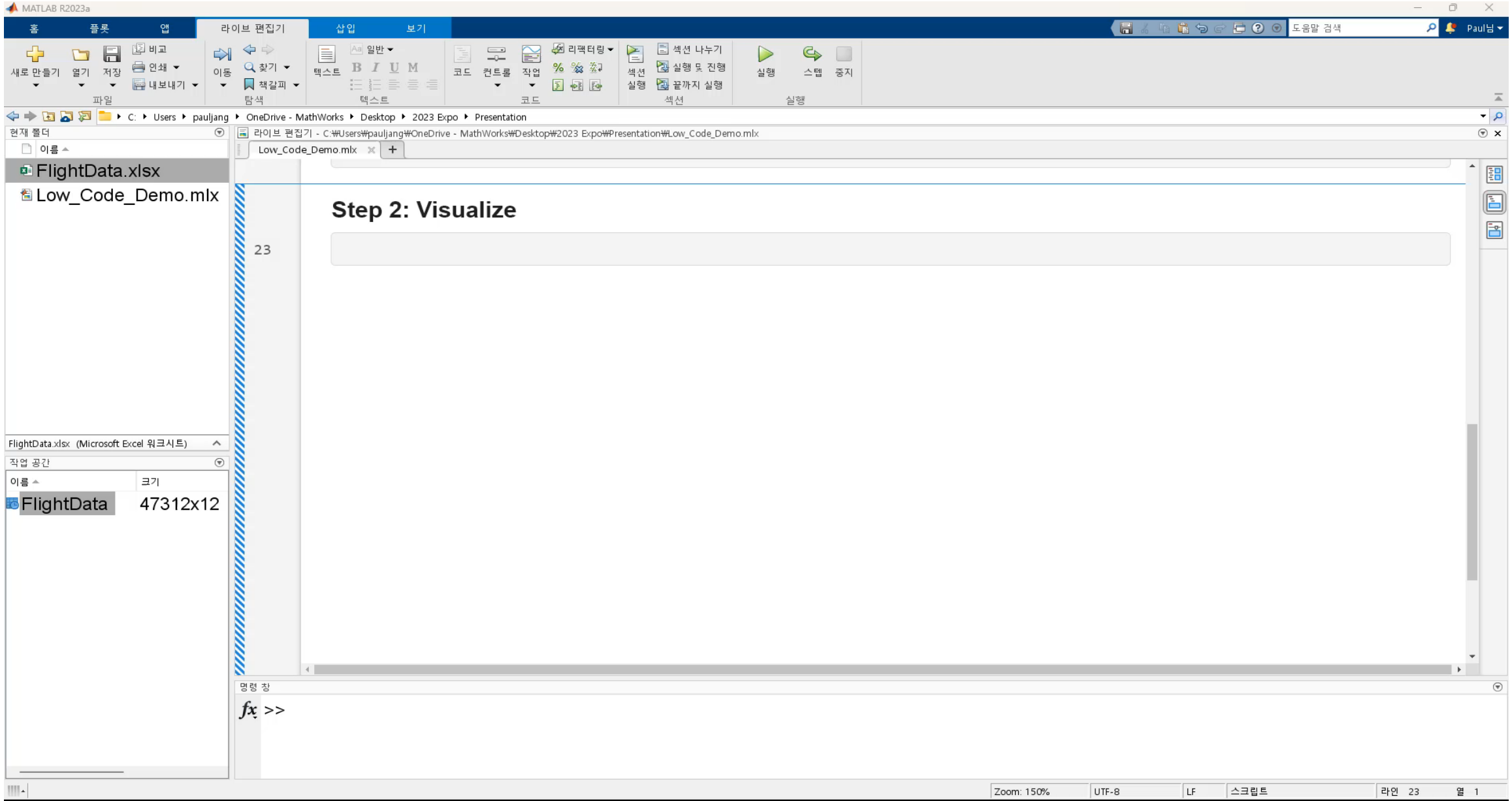
열 1

Data Visualization

- Live Script Task
- Supporting visualization function suitable for various data
- Automatic MATLAB code generation

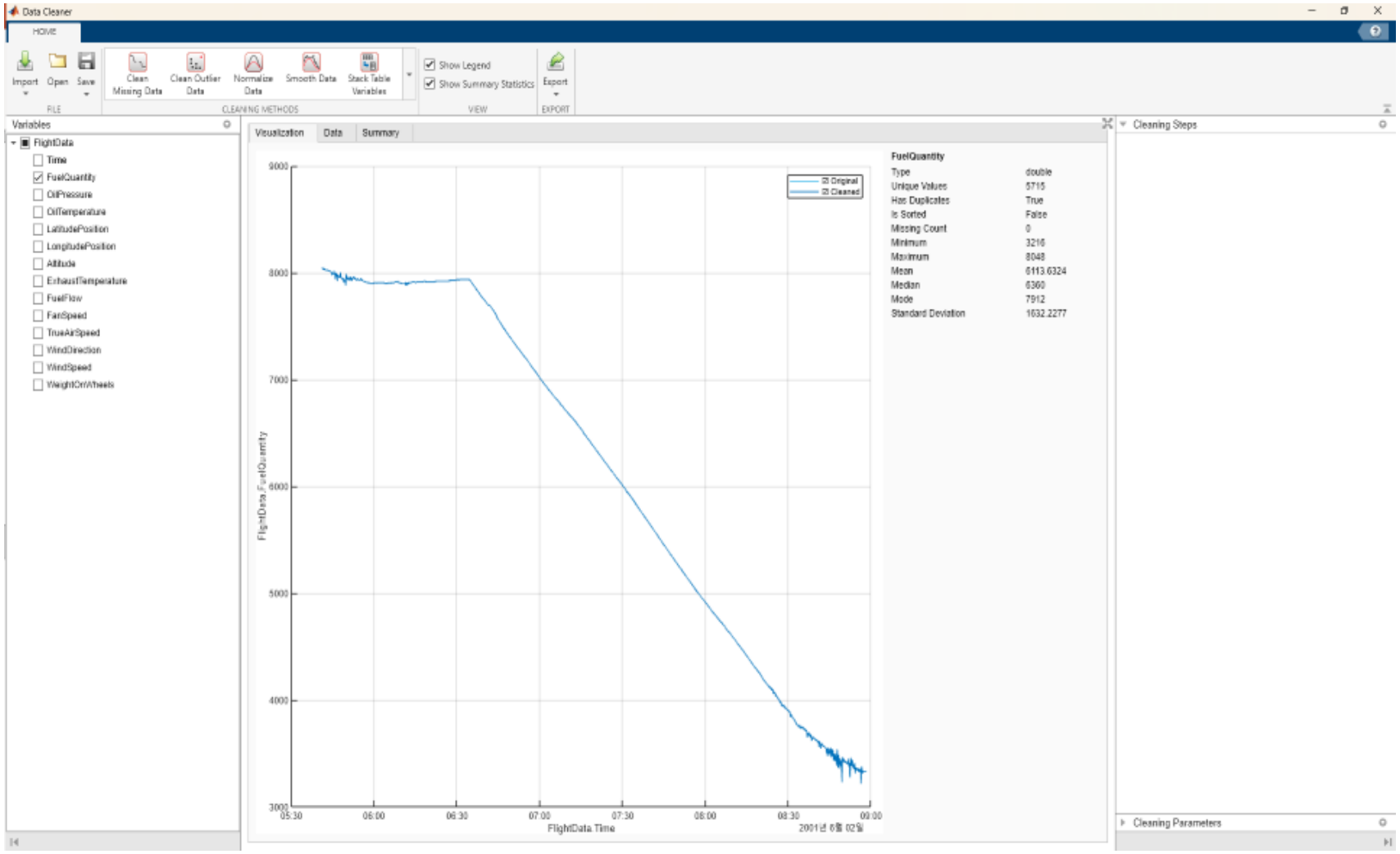


Data Visualization

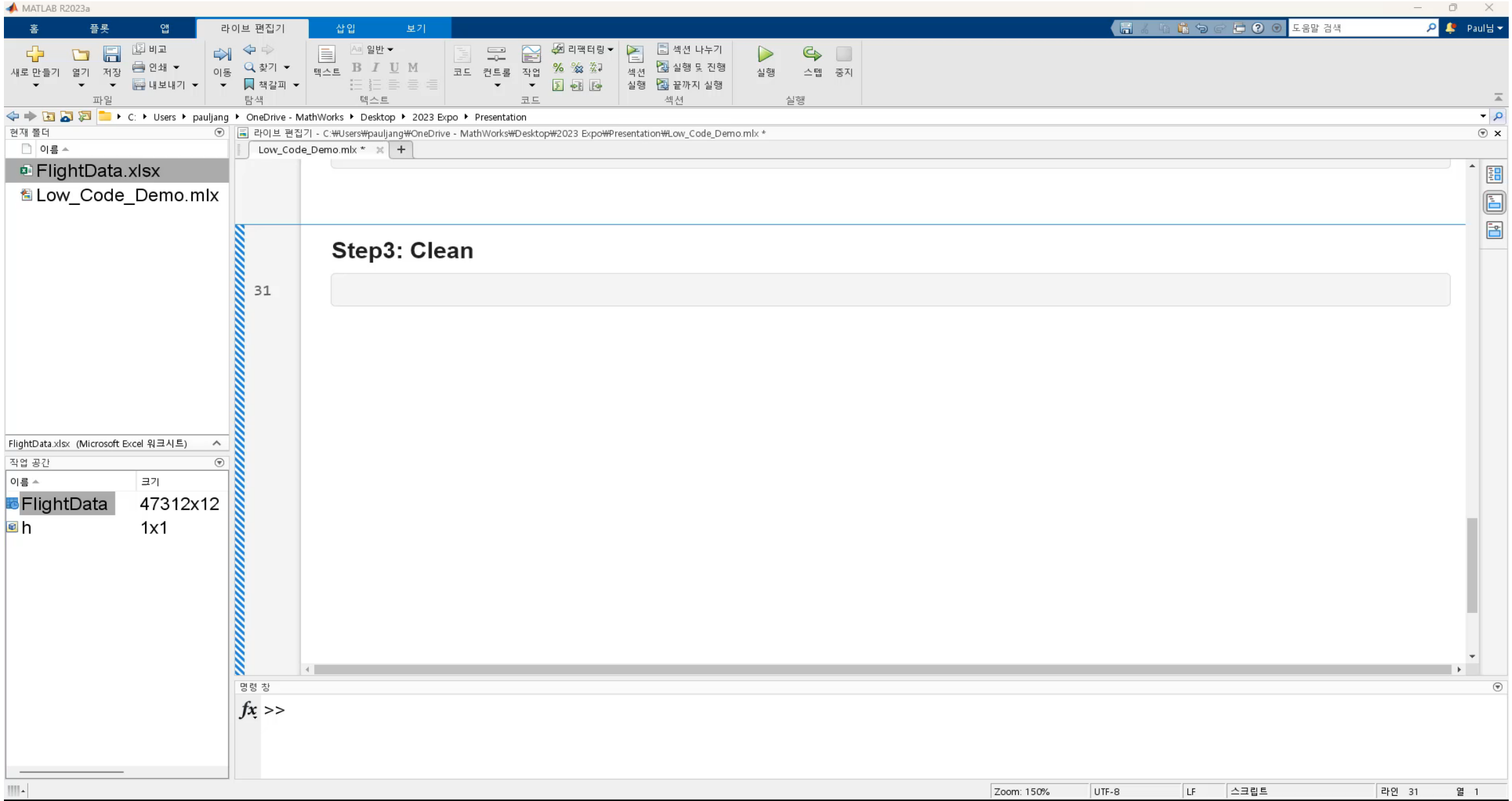


Data Clean

- Data Cleaner App
  - Clean Missing data
  - Clean Outlier data
  - Normalize Data
  - Smooth Data
  - Retime Timetable
- Live Script Task
- Automatic MATLAB code generation



Data Clean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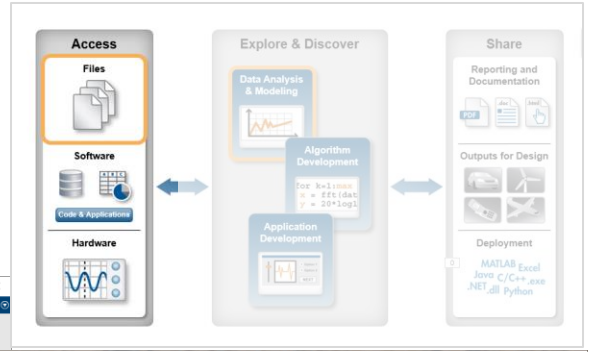
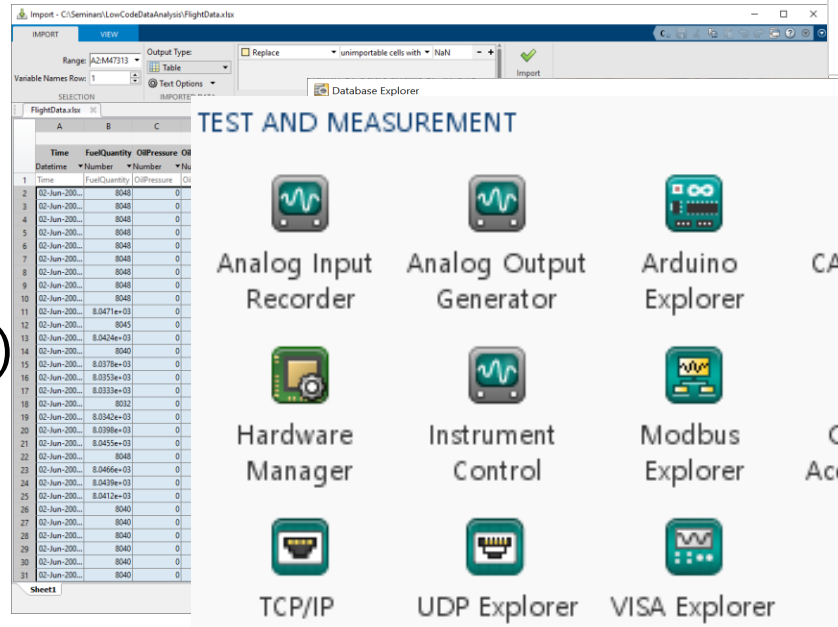
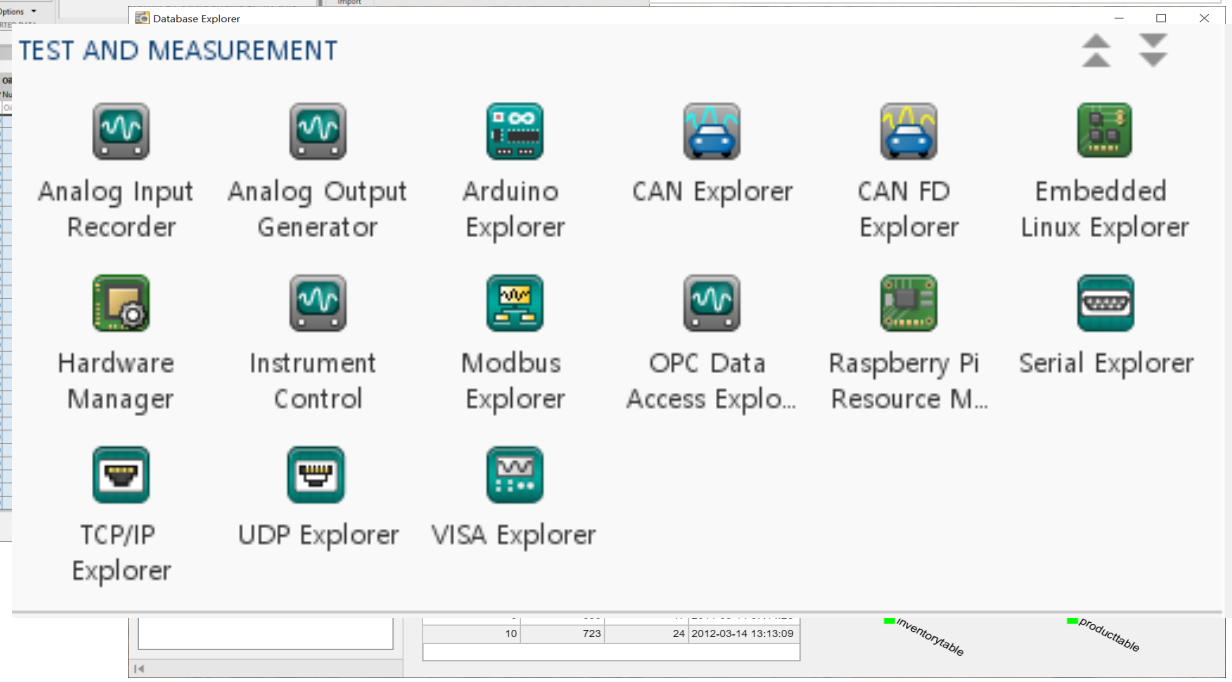
열 1

Easy access to files, databases, and hardware



- Import Tool and Import Live Task
  - Text, CSV, and Excel files

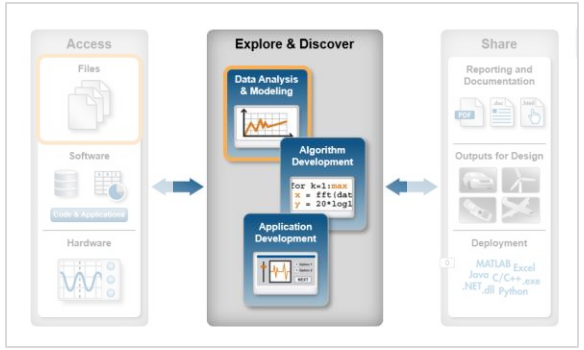




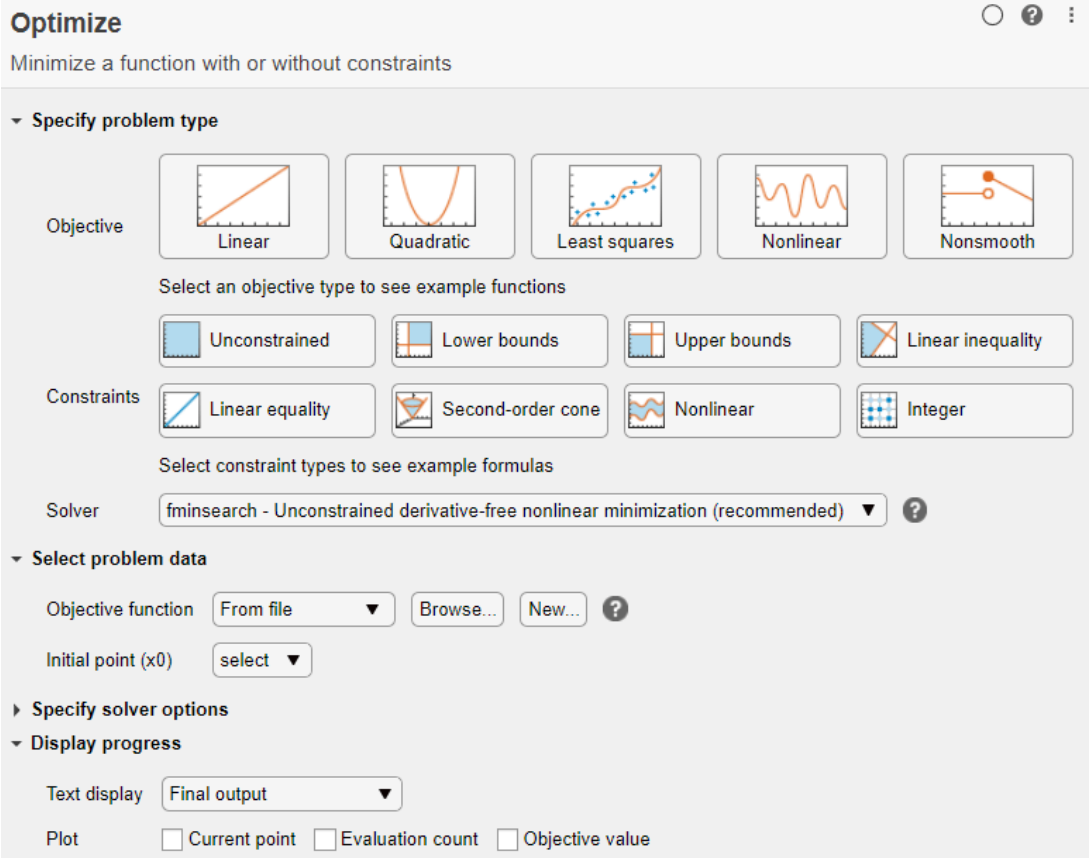
- Database Explorer (*Database Toolbox*)
  - ODBC
  - JDBC

- Measurement hardware and industrial data
  - Data acquisition hardware (*Data Acquisition Toolbox*)
  - Stand-alone instruments and hardware (*Instrument Control Toolbox*)
  - OPC UA and Aveva PI Server, Modbus devices (*Industrial Communication Toolbox*)
  - CAN, J1939, and XCP (*Vehicle Network Toolbox*)

Over 100 low code tools for data analysis, application, and AI

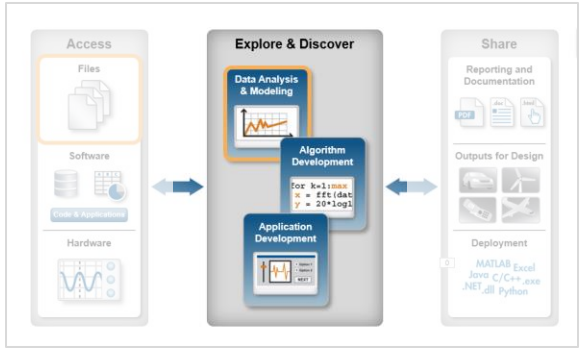


- Data Analysis
  - Visualize, manipulate, and preprocess
  - Math, statistics, and optimization



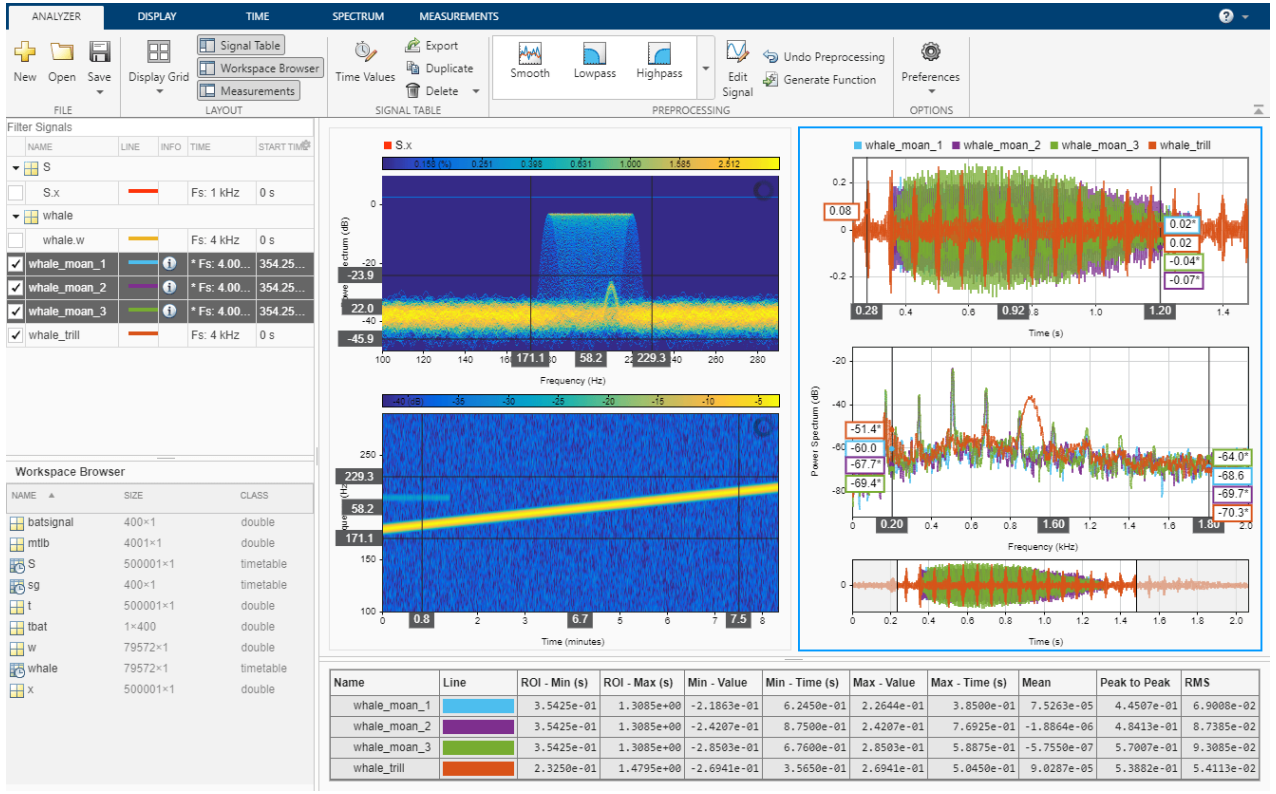
Optimize Live Task (Optimization Toolbox)

Over 100 low code tools for data analysis, application, and AI



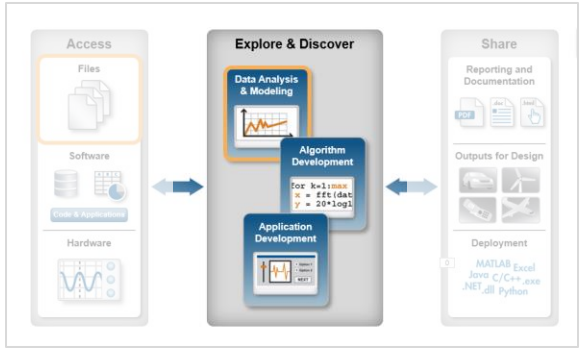
- Data Analysis
  - Visualize, manipulate, and preprocess
  - Math, statistics, and optimization

- Application
  - Control system design and analysis
  - Signal processing and communications
  - Image processing and computer vision

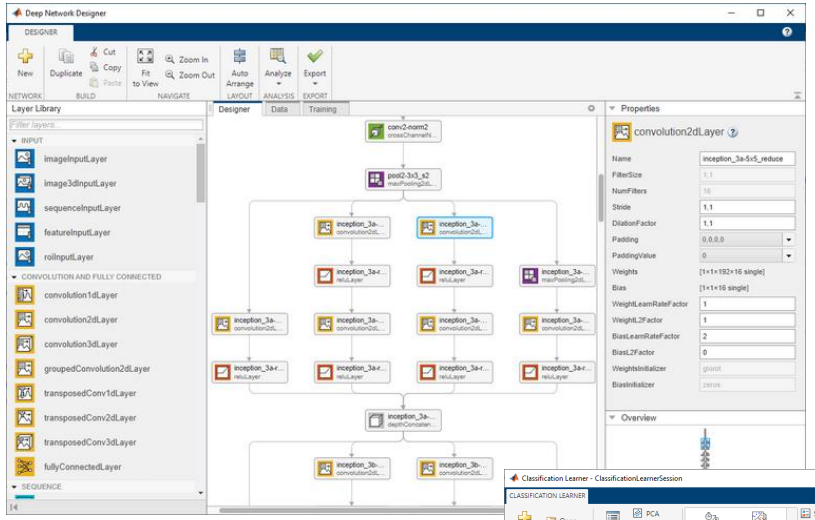


Signal Analyzer (Signal Processing Toolbox)

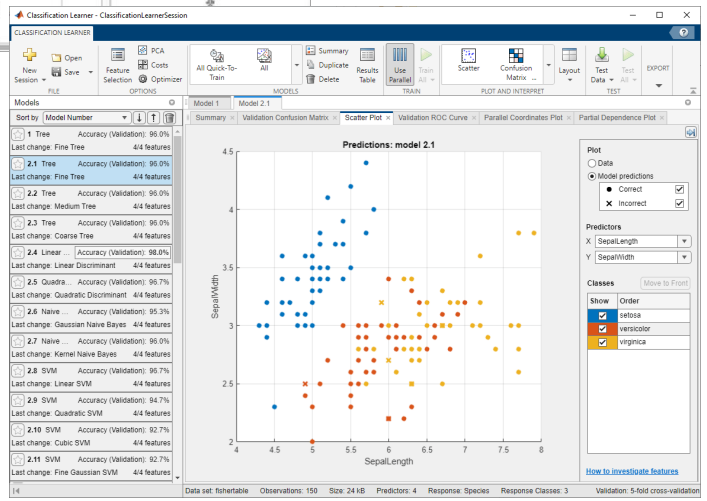
Over 100 low code tools for data analysis, application, and AI



- Data Analysis
  - Visualize, manipulate, and preprocess
  - Math, statistics, and optimization
- Application
  - Control system design and analysis
  - Signal processing and communications
  - Image processing and computer vision
- Artificial Intelligence
  - Ground truth labeling
  - Network design, training, and validation
  - Quantization and deployment

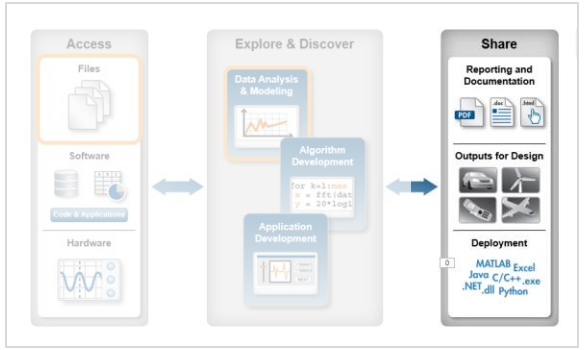


Deep Network Designer
(Deep Learning Toolbox)

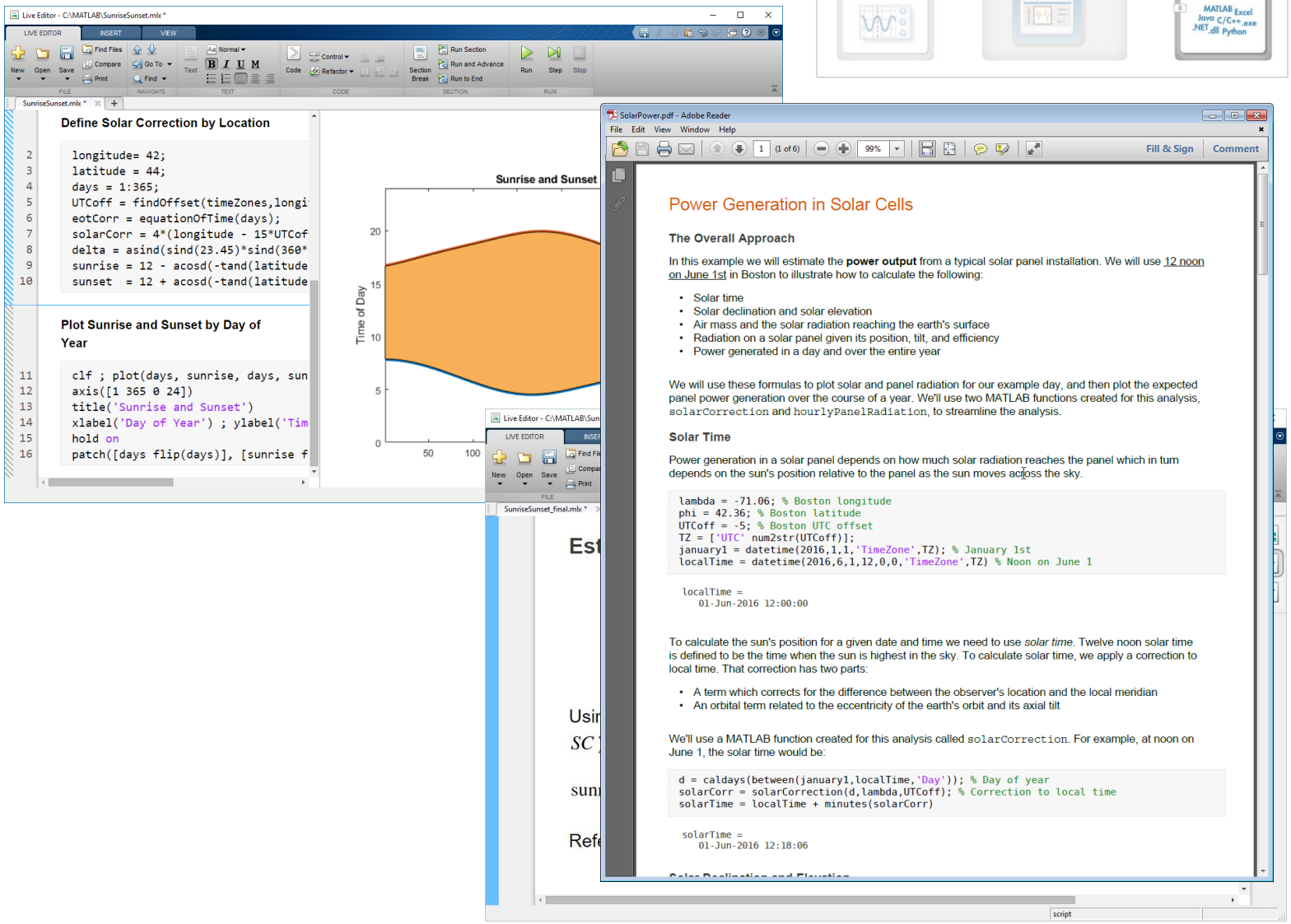


Classification Learner
(Statistics and Machine Learning Toolbox)

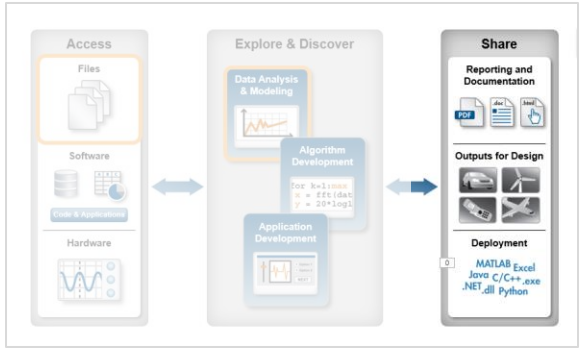
Document as you go – *your script is your report*



- Divide code into sections
- Embed outputs next to the code
- Add rich text formatting, equations, images, and hyperlinks
- Save directly to PDF, HTML, Word, and LaTeX

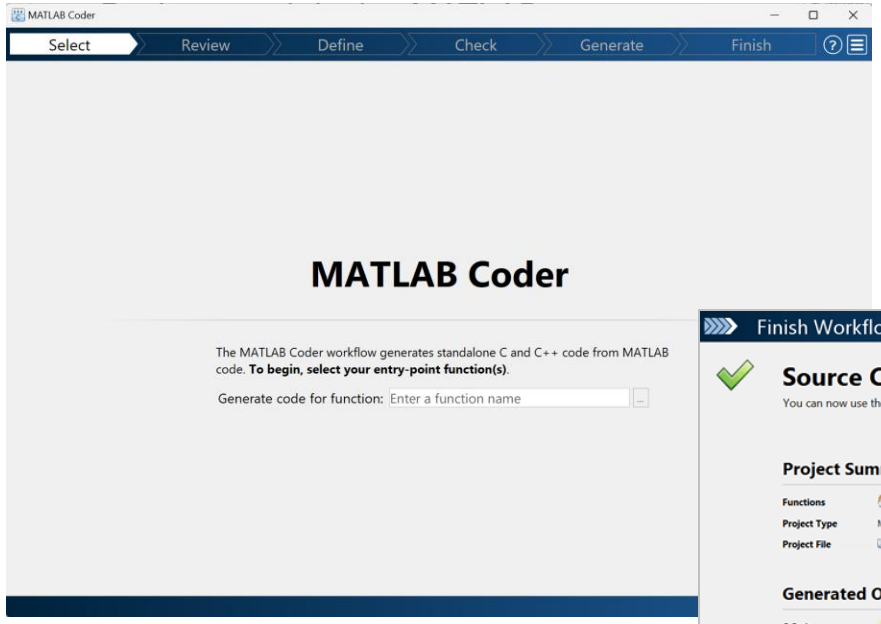


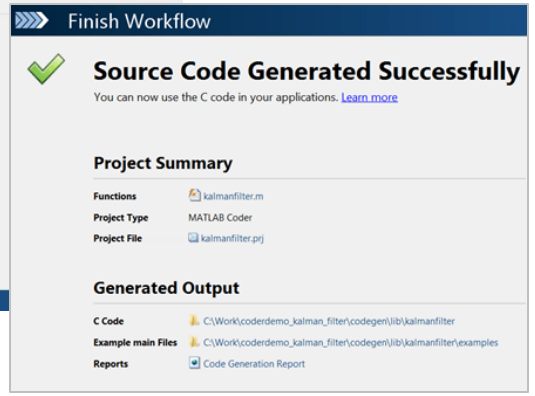
Deploy and integrate MATLAB code



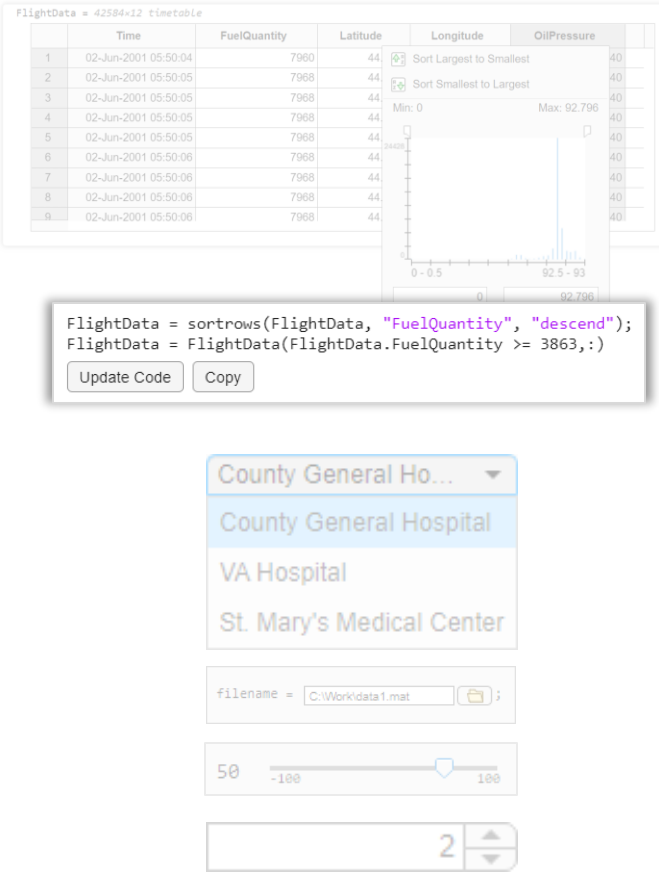
- Package and deploy MATLAB programs

- Generate code
  - C/C++
  - CUDA(Mex)
  - HDL

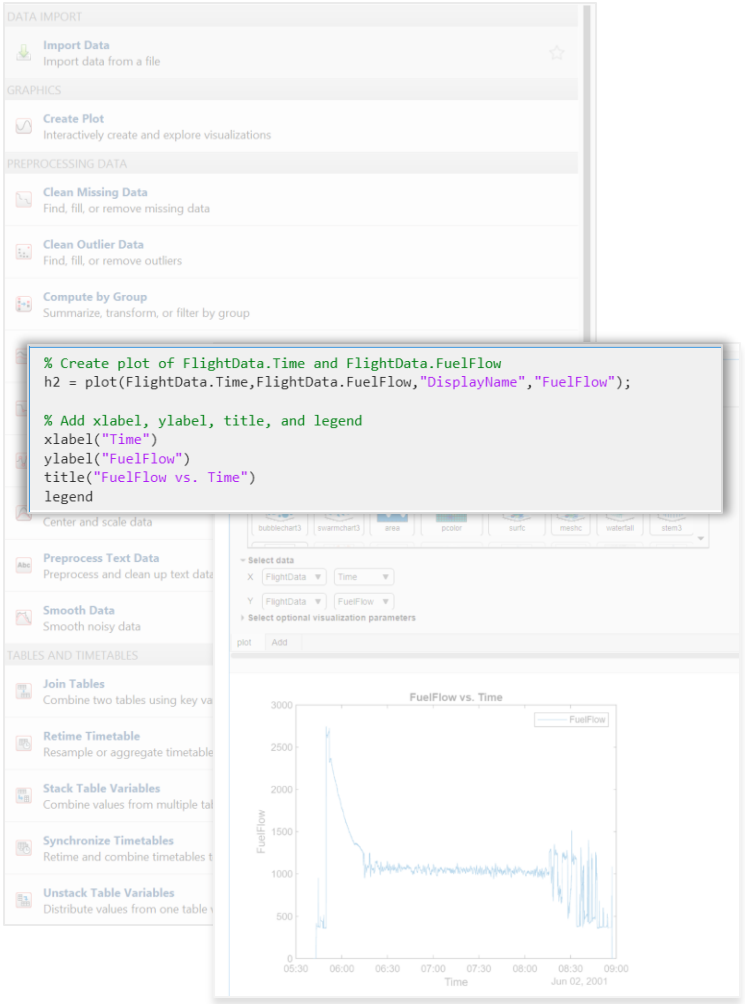




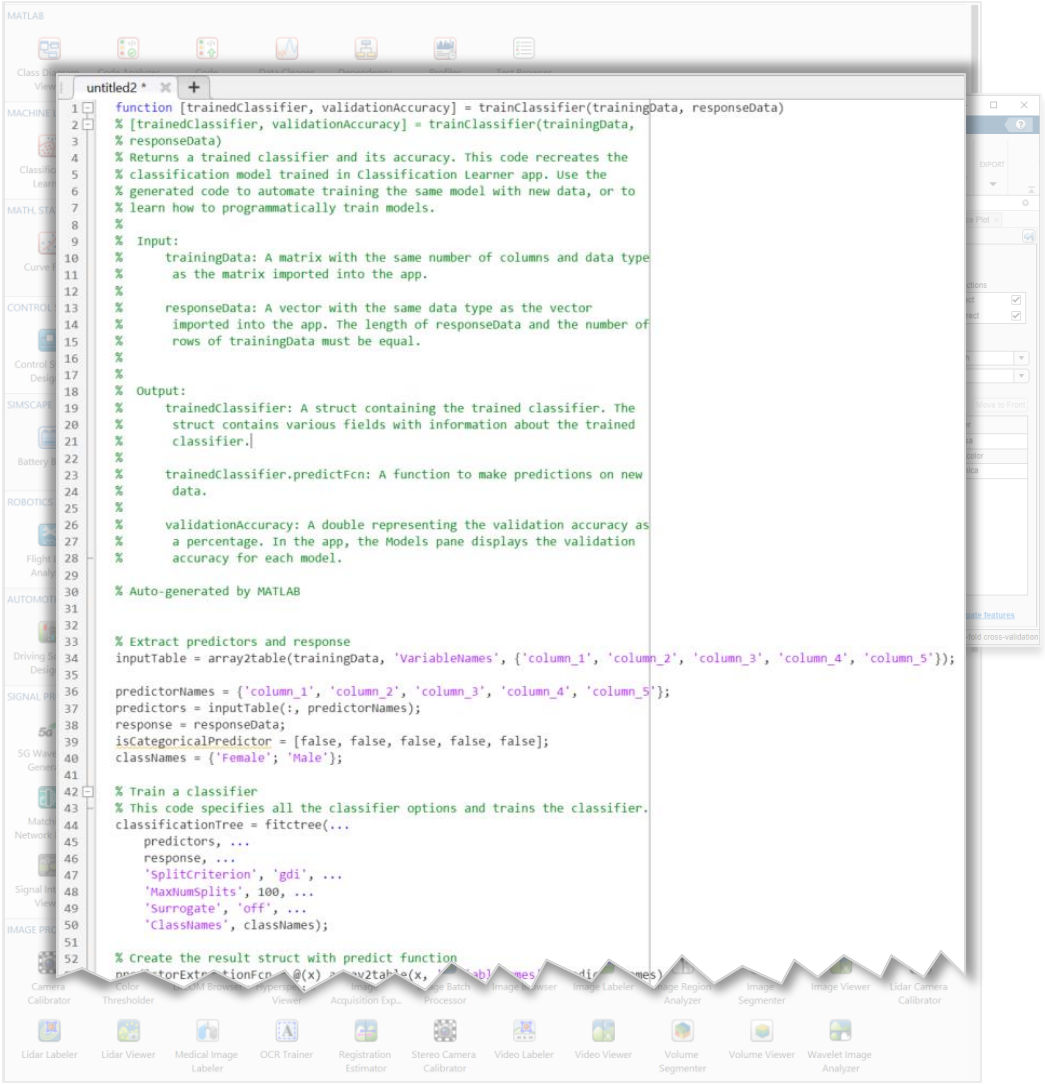
Start with low code … and switch to code easily when needed



Interactive Controls



Live Tasks



Apps

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Thank you

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장규환 부장

pauljang@mathworks.com